Chapter VI – Transportation Policies

Option 15: Adopt Clean Car Standards for New Cars and Light Trucks

Background

The energy efficiency of automobiles relates directly to their emissions of carbon dioxide, the dominant greenhouse gas (GHG). States developing plans to reduce GHG emissions are eager to include cars and light trucks, which contribute 27 percent to U.S. GHG emissions.[136] Eleven states have adopted a clean car standard that will reduce greenhouse gas emissions from new vehicles by 30 percent in 2016 while cutting emissions of traditional pollutants as well. These states are: California, Connecticut, Maine, Massachusetts, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont, and Washington. The governors of Arizona and New Mexico have issued executive orders requiring adoption of the standards, and Maryland enacted legislation doing so in April 2007. Legislation has been introduced in Minnesota, Nevada, Tennessee, and Texas as well.

Measures available to meet the GHG requirements include increased use of alternative fuels and improved air conditioners, for example. But in practice, the primary pathway to meeting the standard will be improvements in vehicle fuel efficiency. Thus, if Utah were to adopt the clean car standard, it could greatly improve vehicle fuel efficiency, thereby helping the state meet the Governor's energy efficiency goal. This would come about through accelerated penetration of technologies that are already entering the market, such as variable valve timing, cylinder deactivation, and 5-speed transmissions, as well as increased sales of hybrid and diesel vehicles.

States adopting the clean car standard have done so through their federal Clean Air Act compliance programs. The Clean Air Act allows states to choose between the federal vehicle pollution control program overseen by the U.S. Environmental Protection Agency and the Low Emission Vehicle program devised by the California Air Resources Board (CARB). The latter program is the clean car program already mentioned.

If Utah chooses this program, it would then regulate emissions of greenhouse gases, hydrocarbons (HC or NMOG), oxides of nitrogen (NOx), carbon monoxide (CO), particulate matter (PM), and formaldehyde (HCHO) as well. The requirements for non-greenhouse gas emissions are similar to, but somewhat more stringent than, the federal program that Utah currently follows. Phase-in of both Tier 2 and the California ("LEV II") program began in 2004. Automakers are finding it easier to comply with both sets of standards with a single set of vehicle offerings, and consequently the vast majority of vehicle models sold carry both federal and LEV II certifications.

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[136] U.S. EPA, "Greenhouse Gas Emissions from Transportation and Other Mobile Sources," http://www.epa.gov/otaq/greenhousegases.htm.

Specific Energy Efficiency Proposal

In this policy, Utah would adopt the clean car standards already adopted by the eleven states listed above. Doing so would mean that new vehicles sold in Utah by each manufacturer would need to meet the requirements shown in Table 16 for GHG emissions, on average. The standards divide vehicles into two categories; larger vehicles are allowed higher emissions than smaller vehicles.

Table 16 – Clean Car Program Greenhouse Gas Tailpipe Standards, 2009-2016

	Year	CO_2-equivalent emissions standard (g/mi)	
		Passenger cars and small trucks/SUVs	Large trucks/SUVs
Near-term	2009	323	439
	2010	301	420
	2011	267	390
	2012	233	361
Mid-term	2013	227	355
	2014	222	350
	2015	213	341
	2016	205	332

Source: California Air Resources Board[137]

Energy Savings

It is expected that manufacturers will meet the greenhouse gas requirements of the clean car standards largely by adding efficiency technologies to their vehicles. If efficiency accounted entirely for the GHG emissions reductions, new vehicles would consume on average 22 percent less fuel in 2012, and 30 percent less fuel in 2016, than the average vehicle consumed in 2002.

This new vehicle efficiency would take some years to spread throughout the vehicle stock. Given the efficiency gains among new vehicles, a "stock model" calculates the increase in average efficiency of all vehicles over time. This leads to the reductions in fuel consumption shown in Table 17, relative to the consumption that would have occurred in the absence of the standards. The stock model used here reflects a "rebound effect": energy savings resulting from higher efficiency are discounted by 10 percent to account for the possibility that purchasing an efficient vehicle causes the owner to drive slightly more.[138]

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[137] Fact Sheet: Climate Change Emissions Control Regulation. Available at http://www.arb.ca.gov/cc/factsheets/cc_newfs.pdf.

[138] Recent research indicates that rebound is under 10%. See K. Small and K. Van Dender "Fuel Efficiency and Motor Vehicle Travel: The Declining Rebound Effect," forthcoming in *Energy Journal*.

Table 17 – Light-duty Vehicle Fuel Savings in Utah from Adoption of a Clean Car Standard

Year	Percent Gasoline savings	Gasoline Savings (thousand barrels per year)	Gasoline Savings (trillion Btu per year)
2009	0.3	78	0.41
2010	**0.9**	**238**	**1.24**
2011	1.7	472	2.46
2012	2.8	796	4.15
2013	4.0	1,172	6.11
2014	5.4	1,600	8.34
2015	**6.9**	**2,076**	**10.83**
2016	8.5	2,595	13.53
2017	10.0	3,108	16.21
2018	11.4	3,615	18.85
2019	12.7	4,108	21.42
2020	**13.9**	**4,586**	**23.92**

Cost and Cost-Effectiveness

The levels for GHGs in the clean car standards were based on an examination of existing and emerging vehicle efficiency technologies that could be applied cost-effectively to new vehicles. The assessment assumes that the distribution of vehicles among size classes will not be affected by implementation of the standards.

CARB estimated the increase in the purchase cost of vehicles as the new standards are phased in over the period 2009-2016. The extra first cost is less than $100 in the early years (2009-2010), but then rises to about $275-375 by 2012 and $1,000-1,500 by 2016. Using these cost estimates, and assuming that vehicle sales in Utah continue increasing at 3.4 percent per year as they have on average over the past decade, we estimate that the clean car standard leads to an investment in vehicle efficiency totaling $250 million in the period 2009-2015, on a present value basis.

The resulting savings in fuel costs over the lifetime of these vehicles (on average15 years) would equal about $1.41 billion (present value), assuming gasoline prices remain at their 2006 levels. This gives a net economic benefit of $1.16 billion (2006 dollars) over the life of the vehicles purchased in 2009-2015. Here, fuel savings exclude state gasoline tax (24.5 cents per gallon). Hence the net economic benefits reflect the loss to the state in fuel tax revenues but not the wealth transfer from the state to consumers.[139] Additional net benefits result from more efficient new vehicles purchased

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[139] It should also be noted that the loss in the state's gasoline tax receipts is in the context of growing gasoline consumption; adoption of the clean car standard would slow the growth in gasoline use, and therefore gasoline tax receipts, but they would not actually decline.

during 2016-2020. In fact, the bulk of the savings occur after 2016, because the standard reaches its maximum in 2016 and the new, efficient vehicles penetrate the vehicle stock gradually over the following fifteen years.

Environmental and Social Benefits

The clean car standard requires reductions in vehicles' greenhouse gas emissions. CO_2 is the primary GHG associated with vehicles. Total avoided CO_2 emissions follow from the fuel savings estimates above, using the fact that each gallon of gasoline consumed produces 19.3 pounds CO_2.[140] Emissions of CO_2 are reduced by 763,000 metric tons in 2015 and by 1.69 million metric tons in 2020. In addition to these "in-use" CO_2 emissions, each gallon burned represents another 5.2 pounds CO_2-equivalent of "upstream" emissions in the production and distribution of the fuel. Thus, global greenhouse gas reduction benefits are 27 percent higher than the figures above indicate.

Because adoption of the clean car standard would include adoption of the LEV II regulations for criteria pollutants, reductions in emissions of pollutants other than GHGs will follow as well. In particular, smog-forming emissions, hydrocarbons, and air toxics will decline somewhat more than they would under the federal Tier 2 program. These benefits will vary from state to state. In Massachusetts, New York, and Vermont, for example, emissions of hydrocarbons in 2020 are projected to decline by 14-17 percent, and air toxics by 19-25 percent, as a result of adopting the LEV II program.[141] Similar benefits in Utah would mean a reduction of about 2,170 tons in hydrocarbon emissions annually by 2020. It should be noted, however, that the LEV II program is not included in the above discussion of costs and cost-effectiveness of the clean car standard.

Being out of compliance with at least one of the National Ambient Air Quality Standards is a prerequisite, under the Clean Air Act, for adoption of the clean car standard. Utah has non-attainment designations only for CO at present and has requested to be redesignated as in attainment for CO statewide. However, under a new federal standard adopted by the U.S.EPA last fall, Utah expects to have non-attainment areas for PM 2.5 once designations under the new standard have been made.

Political and Other Considerations

The clean car program as adopted by eleven states is being challenged by auto dealers and manufacturers on the grounds that federal fuel economy (CAFE) standards preempt state actions to regulate vehicles' emissions of greenhouse gases. The case is before a federal district court in California, which postponed the proceedings in January 2007 pending the outcome of a related suit before the U.S. Supreme Court. The Supreme Court decided the latter suit on April 2, 2007, ruling that the U.S. EPA has authority under the Clean Air Act to

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[140] Based on fuel carbon content in M. Wang "GREET 1.6", Argonne National Laboratory.

[141] Northeast States for Coordinated Air Use Management, "Comparing the Emissions Reductions of the LEV II Program to the Tier 2 Program," 2003. White paper, available at www.nescaum.org/documents/**lev**_report_final.pdf.

regulate vehicles' greenhouse gas emissions. Because the states adopting the vehicle GHG standard did so as part of their compliance with Clean Air Act requirements, this finding was a prerequisite for states to proceed with implementation of the clean car program. Remaining hurdles are the preemption case and the need for California to obtain a waiver from EPA allowing adoption of air pollution standards more stringent than federal standards.

Utah has had no official deliberations and taken no steps with regard to the clean car standard. The Governor recently announced a global warming initiative for the state, however, and states undertaking such plans have often found the clean car standards to be among the most effective ways to reduce transportation sector GHG emissions. Also, Utah has joined the Western Climate Initiative and the other five states participating in this initiative have either adopted or are in the process of adopting the clean car standards.

Priority

Based solely on its ability to improve energy efficiency in the 2010-2020 timeframe and provide large net economic benefits, the clean car standard should receive **high priority** among transportation sector measures.

Option 16: Adopt Incentives to Stimulate Purchase of More Efficient Cars and Light Trucks

Background

Both state and federal governments have provided monetary incentives to promote the purchase of more efficient vehicles. At the federal level, for instance, there is a "gas guzzler tax" that imposes a surcharge on cars with a fuel economy of less than 22.5 miles per gallon.[142] There are also federal tax credits for the purchase of efficient, advanced technology vehicles such as hybrid vehicles. Tax credits for hybrids are offered by some states as well.

In its 2007 session, the Utah Legislature debated House Bill 122, offering a $1,000 tax credit for the purchase of any vehicle meeting certain stringent greenhouse gas and air pollution requirements. As discussed above, a qualifying vehicle would typically be fuel-efficient as well, due to the close relationship between fuel consumption and greenhouse gas emissions. Although the bill faced no major opposition, it did not pass.

A comprehensive, market-based approach to promoting vehicle efficiency is a "feebate," a system of fees and rebates based on vehicle fuel economy and applying across the spectrum of vehicles. Part of the rationale for a feebate is that consumers tend to undervalue fuel economy when they are choosing a vehicle. A feebate can be designed to be "revenue-neutral," i.e. so that the implementing entity incurs no net cost or revenue. Another positive feature of feebates is that they provide an incentive for improvement in vehicles of any efficiency level and continue to do so as long as the program remains in place.

Feebates have not been implemented anywhere in the U.S. to date. California and Maryland passed feebate legislation in the early 1990s, and Connecticut in 2005; however, none of these programs have reached the implementation stage. Several states are currently considering feebates.

Specific Energy Efficiency Proposal

This policy would establish a feebate program for new light duty vehicles (cars and light trucks) sold in Utah. The simplest form for an incentive program of this type is to set the amount of the fee or rebate for a given vehicle to be proportional to the number of gallons it consumes relative to a vehicle with a chosen fuel economy baseline. The feebate is then entirely determined by the choice of baseline and a constant of proportionality, i.e. the feebate "rate" in dollars per gallon consumed relative to the baseline.

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[142] The gas guzzler tax has been successful in minimizing the production of highly-inefficient cars, but it does not apply to SUVs, minivans, and pickups.

The rate we propose here is $1,000 per gallon per 100 miles, along with a baseline of 21 miles per gallon in a combined city/highway rating.[143] Under this feebate, a vehicle with a fuel economy of 35 miles per gallon, for example, would receive a rebate of

$$\$1,000 \times (100/21 - 100/35) = \$1,900$$

Similarly, a vehicle with a fuel economy of 15 miles per gallon would pay a fee of $1,900. These examples fall near the ends of the fuel economy spectrum; most vehicles would receive a rebate or fee of under $1,000.

The feebate would go into effect in 2008. Each year, the baseline would need to be adjusted upwards to keep up with the rising efficiency of vehicles sold; otherwise, the state would sustain a net revenue loss through the program. Given that the adjustment will need to be set in anticipation of the year's average fuel economy, some guessing will be required. Small errors in projected fuel economy can be corrected in subsequent years.

As an alternative to the feebate, Utah could continue to pursue the incentives for high-efficiency vehicles proposed in H.B. 122. Under this proposal, gasoline vehicles would need to meet a fuel economy threshold of 36 miles per gallon to qualify, and also meet the criteria emissions requirements of either the federal Tier 2 bin 2 standard or California's LEV II SULEV standard, both relatively stringent standards. Under H.B. 122, the tax credit would be in place from January 1, 2008 through December 31, 2010.

Energy Savings

Projecting the effect of a feebate program on consumers' vehicle choices is a somewhat speculative undertaking, given that no feebates have yet been implemented. Extensive modeling of feebates has been done, however, because feebates have been regarded for some time as a promising vehicle efficiency policy. Two analyses were conducted by U.S. Department of Energy's national laboratories using "discrete choice" models of consumer buying decisions.[144] Both concluded that the primary effect of a feebate at the national level would be that manufacturers would put more and better efficiency technologies into their vehicles, while direct consumer response (i.e. altering the choice of vehicle to buy) would be limited.

In the case of a state-level program, though, manufacturers would be far less responsive, because the feebate would affect only a fraction of the vehicle market, for which a vehicle redesign would not be warranted. Therefore, a state feebate would be most effective if several other states were adopting the program as well. On the other hand, a single-state

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[143] This is EPA's projected national average on-road ("adjusted") new vehicle fuel economy for 2006 and should be slightly above the average for new vehicles in Utah, where the percentage of light trucks (SUVs, minivans, and pickups) is 7% higher than the national average (see UT vehicle data sheet).

[144] D. Greene, P. Patterson, M. Singh, and J. Li. 2005. "Feebates, Rebates and Gas-Guzzler Taxes: A Study of Incentives for Increased Fuel Economy." *Energy Policy,* 33 (6); and W.B. Davis, W.B., M.D. Levine, K.Train, and K.G. DuLeep. 1995. "Effects of Feebates on Vehicle Fuel Economy, Carbon Dioxide Emissions, and Consumer Surplus," DOE/PO-0031, U.S. Department of Energy, Office of Policy.

program could still improve efficiency because in the absence of a manufacturer response consumers will have substantial incentive to switch to more efficient models.

Here we estimate energy savings from a feebate by applying a modification of a model developed by the agency Transport Canada, which was in turn based on one of the national laboratory models mentioned above, but which can evaluate a state-level program.[145] The version we use assumes that manufacturers will improve the fuel economy of a given vehicle model in response to a feebate if and only if sales of that model exceed 10,000 vehicles per year in the market to which the feebate applies.

No vehicle models meet that sales criterion in Utah alone. In the absence of a manufacturer response to the feebate, consumers will change their choice of vehicle to some degree. The model predicts that a Utah-only feebate program would improve the fuel economy of new vehicles by 2 percent relative to business-as-usual. This increase would be realized from the outset, because no new products would need to be brought to market.

The model also predicts that if Utah were one of a group of states comprising, say, 25 percent of the national vehicle market that jointly adopts the program, new vehicle fuel economy would improve by 9 percent. In this case, the improvement requires more time to materialize, because the response is dominated by manufacturers' addition of fuel-saving technologies to certain high-volume vehicles over several years. Applying a stock model to determine the effect of increasing new vehicle fuel economy on the entire vehicle stock gives the results shown in Table 18.

Table 18 – Savings from a Multi-State Feebate Program

Year	Percent Gasoline savings	Gasoline Savings (thousand barrels per year)	Gasoline Savings (trillion Btu per year)
2009	0.3	67	0.35
2010	**0.6**	**164**	**0.86**
2011	1.0	290	1.51
2012	1.6	464	2.42
2013	2.2	636	3.32
2014	2.7	811	4.23
2015	**3.3**	**984**	**5.13**
2016	3.8	1,152	6.01
2017	4.2	1,318	6.87
2018	4.7	1,480	7.72
2019	5.1	1,635	8.53
2020	**5.4**	**1,784**	**9.31**

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[145] Thanks to Transport Canada for granting permission to use this model and for providing helpful suggestions for doing so.

Energy savings from H.B. 122 would be considerably smaller, due to the small number of vehicles involved. Only four model year 2007 vehicles available in Utah would qualify: Honda's Civic Hybrid and the natural gas-powered Civic GX, and Toyota's Prius and Camry Hybrid. Sales of these vehicles in 2005 and 2006, as well as currently applicable federal tax credits, are shown in Table 19.

Table 19 – Incremental Cost and Sales Data for Eligible Vehicles

Model	Approximate Incremental Cost ($)	Current Federal Tax Credit ($)	Sales in 2005[146]	Sales in 2006 (prorated)
Civic Hybrid	3,000	2,100	191	203
Civic GX	5,000	4,000	10	20
Prius	3,000	788	693	805
Camry Hybrid	4,000	650	NA	362

Additional models having fairly high sales volumes, such as the Toyota Corolla, could become eligible in an upcoming model year as a result of meeting a higher tailpipe emissions standard. This would increase both benefits and costs of the program. To get a sense of the magnitude of energy savings, assume that the number of eligible vehicles sold will be 2,800 in 2008, 4,200 in 2009, and 5,600 in 2010, out of approximately 120,000 light-duty vehicle sales per year in Utah. We also assume that 1,400 of these vehicles each year are "free riders", i.e. they would have been purchased whether or not the incentives were in place.

Taking into account that these eligible vehicles typically would substitute for relatively light vehicles, we estimate savings per car sold to be about 150 gallons per year. Total savings would then be roughly 5,000 barrels in 2008, 15,000 barrels in 2009, and 30,000 barrels in 2010.

Cost and Cost-Effectiveness

The initial cost of a feebate program to a consumer is the incremental cost of the vehicle purchased by the consumer under the feebate, plus the fee or rebate incurred by the vehicle. If the zero point for the feebate is set so that the program is revenue-neutral, the value of the feebate for the average car buyer will be zero. Vehicles will have more efficiency technologies; the incremental first cost of these vehicles is computed by the model we used to project energy savings. In the case in which Utah joins 25 percent of the U.S. vehicle market in adopting a feebate, the cost of this added vehicle efficiency totals $176 million in the period 2009-2015, on a present value basis.

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[146] Utah State Tax Commission data, available at http://tax.utah.gov/esu/motor/index.html. 2006 sales numbers are estimates based on part-year data and do not reflect seasonal variations in sales.

The resulting savings in fuel costs (again, exclusive of state tax) over the 15-year life of these vehicles would be $1.12 billion (present value). Net economic benefits of the feebate would then be $950 million (2006 dollars) over the life of the vehicles purchased in 2009-2015. Additional net benefits result from more efficient new vehicles purchased during 2016-2020.

In the case of tax credits, cost of the measure will depend greatly on which models qualify over the three year period. We assume here that the average incremental cost of eligible vehicles is $1,000, so that the state incentive fully offsets the extra cost of the vehicle. The total cost of the incentive is then $8 million, while fuel cost savings over the life of the vehicles purchased is $36 million (present value). The cost would be greater if tax credits were in effect for more than three years.

Environmental and Social Benefits

We estimate that the vehicle efficiency increase due to the multi-state feebate program would result in a reduction in CO_2 emissions of 362,000 metric tons per year by 2015 and 656,000 metric tons per year by 2020.

The proposed feebate program has no explicit requirements for emissions of regulated air pollutants, and no such benefits are assured. High fuel economy vehicles are more "inherently low-emitting" than are low fuel economy vehicles in the sense that reducing fuel throughput reduces the amount of pollution generated, all other things being equal. However, today's emissions control systems depend heavily on advanced technologies far more than reduced fuel throughput to reduce emissions, and a very efficient vehicle lacking these technologies could be far dirtier than a less efficient vehicle that has them. Moreover, making cars more efficient by moving to diesel or another "lean burn" technology can increase regulated pollutants, especially NOx and PM. On balance, it seems likely that average emissions of regulated pollutants is likely to decline as a result of a feebate, but ensuring this outcome would require adding an emissions-based criterion to the feebate. A feebate program could include an emissions component, but this would make it more complicated.

The tax incentives in H.B. 122 would reduce CO_2 emissions by 10,000 tons per year in 2015 and by 8,000 tons per year by 2020. In this case the stringent threshold for criteria pollutant emissions guarantees pollution benefits. NO_x and hydrocarbons, for example, would be reduced by roughly 5 tons per year and 7 tons per year, respectively, in 2015.

Political and Other Considerations

A feebate would be a useful complement to the clean car standard (Option 19). Auto manufacturers assert that meeting standards for fuel economy and greenhouse gas emissions require distorting the market, given the limited roles these matters play in consumers' vehicle choices. Feebates help to align consumer interests with more stringent vehicle standards.

Should legal obstacles arise to the implementation of a clean car standard as described above, feebates could serve as a partial alternative. In this case, it is likely that states that have already adopted the clean car standard would consider a feebate. These states comprise over 25 percent of the U.S. vehicle market, consistent with the multi-state feebate scenario discussed above.

As a market-based, self-funding measure, a feebate will appeal to many who dislike regulation. Others may object that a feebate of the simple form discussed here is unfair to consumers who need larger vehicles. Compact cars, for instance, will typically receive rebates, while large SUVs will typically incur fees. One approach to addressing this concern is to set separate baselines for separate classes of vehicles. This structure will raise objections as well, since the situation can arise that a given car will have to pay a fee while an SUV that consumes more gasoline than the car will receive a rebate. Increasing the number of vehicle classes will reduce the fuel economy gains from the feebate, but in the multi-state feebate scenario, the reduction in energy savings will be small.

Other departures from the simple feebate structure discussed above will be advanced as a feebate program is publicly vetted. One proposal has been to exempt work trucks, for instance. Rather than changing the structure to accommodate concerns of the various interests, we suggest that mitigation measures outside of the basic structure be considered to offset any inequitable outcomes.

The tax credit provision is likely to be politically popular. Cost to the state is not reflected separately in the discussion above; with the illustrative assumptions used there, cost to the state over the three-year incentive program would be $12.6 million.

Priority

A feebate policy could have a significant impact on new vehicle energy efficiency while being revenue neutral, or close to revenue neutral, for the State Treasury, assuming it is adopted by a number of states in a coordinated manner. However, given the difficulty in ensuring such coordinated state action, we recommend that feebates be viewed as a **medium priority** option by the Governor and Legislature.

Option 17: Adopt Pay-As-You-Drive Auto Insurance

Background

One reason that people use their vehicles as much as they do is that a high percentage of total driving costs are "fixed" costs, i.e. they are independent of the number of miles driven. The impacts of driving, however, are very dependent on how much people drive. One approach to reducing miles driven is to convert a largely fixed cost, such as insurance, to a variable cost. "Pay-as-you-drive" (PAYD) insurance accomplishes this by having the rate paid by an individual depend heavily on the number of miles driven. Drivers would pay a portion of their premiums up front, and the remainder would be charged in proportion to mileage, as determined by a global positioning device or periodic odometer readings. In principle, this makes sense from the insurance industry's perspective as well, because those who drive fewer miles have lower accident exposure, on average. It is estimated that increasing the variable cost of driving through PAYD insurance can reduce vehicle use by 10-12 percent.[147]

The 2005 federal transportation funding law "SAFETEA-LU" includes a new $3 million per year set-aside for experimental, market-based incentive programs like PAYD insurance. Several states have already applied for funding.[148]

A PAYD program could be an insurance company policy or product, but some action on the part of the state may be required to remove regulatory obstacles to changing the basis for premiums or to promote the program. Few insurance companies have come out in support of PAYD, but some experimental programs are already in place: GMAC offers a mileage-based discount in Arizona, Indiana, Illinois, and Pennsylvania, and Progressive Insurance has a pilot program in Minnesota and is launching one in Texas, where the Legislature has passed a bill allowing companies to offer mileage-based coverage. California recently approved regulations increasing the mileage-based component of insurance rates, and Oregon is providing tax credits to insurers offering pay-as-you-drive policies. Georgia is conducting a PAYD study, and Washington a pilot project, both funded by the Federal Highway Administration.[149] While some states' insurance laws prohibit changing the rate basis for insurance policies in the way that PAYD insurance would require, there are no legal barriers in Utah.[150]

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[147] T. Litman. 2005. Pay-As-You-Drive Vehicle Insurance: Converting Vehicle Insurance Premiums Into Use-Based Charges. http://www.vtpi.org/tdm/tdm79.htm . Victoria Transportation Policy Institute**.**
[148] Environmental Defense, *Pay-As-You-Drive Auto Insurance.* http://www.environmentaldefense.org/article.cfm?contentid=2205
[149] Federal Highway Administration, *Value Pricing Project Quarterly Report October-December 2006* http://www.ops.fhwa.dot.gov/tolling_pricing/value_pricing/quarterlyreport/qtr4rpt06/index.htm; Sightline Institute, *Pay-as-You-Drive Pilot in Washington* http://www.sightline.org/daily_score/archive/2007/03/29/pay-as-you-drive-pilot-in-washington (2007).
[150] R. Guensler, A. Amekudzi, J. Williams, S. Mergelsberg and J. Ogle, *Current State Regulatory Support for Pay-As-You-Drive Insurance*. Journal of Insurance Regulation, Vol. 21, No. 3, Spring 2003.

Specific Energy Efficiency Proposal

This policy would phase in PAYD insurance in Utah, starting with a pilot program. For three years beginning in 2008, Utah would offer incentives for insurance policies based largely on miles driven. More specifically, the state would grant $200 to insurance agencies for each one-year policy they write for which 90 percent or more of the pre-program policy cost is scaled by the ratio of miles driven to the state average miles driven. The incentive is necessary so long as PAYD is optional; without it, insurance companies will lose money on the low-mileage customers who would choose such a policy without being able to offset these costs with higher premiums for high-mileage customers. Should the pilot program prove successful, we recommend phasing in a mandatory PAYD insurance program over the next ten years (2011-2020).

Insurance companies would be responsible for converting a percentage of their policies to PAYD, with the percentage increasing each year until PAYD is universal in 2020. Along with implementing PAYD insurance, the state should educate vehicle owners on how they can reduce their insurance payments by driving less.

Energy Savings

Estimates of the reduction in vehicle-miles traveled (VMT), and therefore energy use, resulting from a PAYD policy depend upon the price elasticity of travel demand, i.e. the percent change in travel resulting from each percent increase in the cost of travel. Estimates of elasticity vary considerably among those who study them, and differ also according to the time elapsed between the change in price and the response to it. We use here a value of -0.2 for the long-term elasticity of driving with respect to gasoline price; that is, over 10-15 years, we assume there is a 2 percent reduction in driving for a 10 percent increase in gasoline price.[151] At $2.60 per gallon, gasoline for an automobile or light truck having the average on-road fuel economy of 20.2 miles-per-gallon costs 13 cents per mile.[152] The cost of the average insurance policy in Utah in 2005 was $913, and vehicles in Utah are driven 12,124 miles per year on average.[153] This means an average insurance cost of 7.5 cents per mile.

If 90 percent of the cost of the insurance premium were charged on a per-mile basis, the average cost per mile would then be 6.8 cents per mile, about half the per-mile cost of fuel. Variable driving costs would increase by 51 percent as a result. An elasticity of -0.2 implies a corresponding reduction in driving of 10 percent. Thus 100 percent adoption of PAYD insurance would be expected to reduce car and light truck energy use in Utah by 10 percent over 10-15 years.

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[151] See, e.g., D. Greene and P. Leiby, *The Oil Security Metrics Model Oak Ridge National Laboratory*, 2006 and T. Litman, *Transportation Elasticities: How Prices and Other Factors Affect Travel Behavior*, Victoria Transportation Policy Institute http://www.vtpi.org/tdm/tdm11.htm#_Toc119831339. Updated March 7, 2007.

[152]*Annual Energy Outlook 2006*. DOE/EIA-0383(2006). Washington, DC: Energy Information Administration, p. 145.

[153] Insurance rates from Bureau of Labor Statistic http://data.bls.gov; miles per year calculated from 2005 vehicle registration and miles traveled data from UDOT and the Utah State Tax Commission.

The program proposed here begins with a 3-year pilot program subsidized by the state. The state would offer insurance companies a $200 incentive per PAYD policy, with goals of 2,000 policies in 2008, 10,000 policies in 2009, and 20,000 policies in 2010. A mandatory program would then be phased in over the next ten years. This program would be expected to result in a 10 percent reduction in driving and VMT, and consequently light-duty vehicle energy use, by 2020. Table 20 presents the projected impacts by year. Gasoline savings reach 1.5 million barrels per year by 2015 and 3.3 million barrels per year by 2020.

Table 20 – Estimated Impacts of a Mileage-Based Pay-As-You-Drive Insurance Program

Year	Percent Reduction in VMT	Gasoline Savings (thousand barrels per year)	Gasoline Savings (trillion Btu per year)
2008	0.01	3	0.015
2009	0.06	15	0.078
2010	**0.11**	**30**	**0.16**
2011	1.0	279	1.46
2012	2.0	569	2.96
2013	3.0	869	4.53
2014	4.0	1,180	6.16
2015	**5.0**	**1,503**	**7.84**
2016	6.0	1,838	9.58
2017	7.0	2,184	11.39
2018	8.0	2,543	13.26
2019	9.0	2,915	15.20
2020	**10.0**	**3,299**	**17.20**

Cost and Cost-Effectiveness

Direct costs to the state would be $200 per PAYD policy in the first three years. This means costs of $400,000 in 2008, $2 million in 2009, and $4 million in 2010 assuming the goals are met. The present value of these costs (2006 dollars) is $5.4 million. This sum goes to insurance companies and their customers, and should perhaps not be regarded as net costs, but we will treat them as such here. To estimate benefits in a manner similar to that used for policies discussed previously, we consider fuel savings only for insurance policies written through 2015, although one could argue that once the policy is fully established, it continues to provide the full benefit of a 10 percent fuel cost reduction for every year thereafter. PAYD policies written during 2008-2015 would save $303 million. Net benefits are therefore $298 million. We do not attempt to quantify savings to the state with respect to infrastructure and highway patrol costs, although these costs should decline with a reduction in driving.

This account of net benefits does not include consumer insurance premiums. Once PAYD is universal, consumers will pay either more or less than they did prior to program implementation, depending on how much they drive. On average, however, insurance

premiums should decline by 9 percent as a result of the reduction in driving. This means a decline in revenues to insurance companies, but the companies should experience a commensurate decline in claims as well.

Environmental and Social Benefits

Reducing VMT will reduce emissions of both greenhouse gases and criteria pollutants. Emissions reductions will be roughly proportional to the reduction in miles driven; this leads to the estimates in Table 21. The hydrocarbon and NOx reductions were estimated as follows: Utah's 2002 emissions inventory shows light-duty emissions of 39,400 tons per year of NOx and 49,300 tons of hydrocarbons. The 2007 Ozone Maintenance Plan for Salt Lake and Davis counties projects hydrocarbon and NOx emissions for these two counties out to 2014.[154] Extrapolating these projections to 2020, and assuming that tailpipe emissions will decline by roughly the same percentage statewide as they will for these two counties, due to the federal Tier 2 Program, we arrived at estimates for light-duty NOx and hydrocarbon emission for the state in 2015 and 2020. Multiplying by the percent reduction in vehicle miles traveled brought about by PAYD insurance yields the emissions reduction estimates in Table 21.

Table 21 – Estimated Emissions Reduction from Pay-As-You-Drive Insurance

Pollutant	Avoided Emissions in 2015	Avoided Emissions in 2020
Carbon dioxide (thousand metric tons)	552	1,212
Hydrocarbons (short tons)	1,033	1,446
NOx (short tons)	657	856

Reducing VMT will reduce vehicle accidents and congestion; in fact, by some accounts, the value of these benefits of PAYD insurance is of the same order as the benefit of reduced energy consumption.[155] Implicit in the discussion of consumer premium reductions above is the notion that accident costs would be reduced by 6.7 percent once PAYD is fully phased in, an amount in excess of $100 million per year in Utah. Preliminary studies on the correlation of insurance claims and miles driven confirm a linear relationship, although the results may not justify the relative sizes of fixed and variable components of insurance premiums assumed.[156]

PAYD insurance would also improve the equity of insurance rates. Low-income drivers drive less on average than do high-income drivers. Insurance would become more

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[154] *Utah State Implementation Plan, Section IX, Part D, 8-Hour Ozone Maintenance Provisions for Salt Lake and Davis Counties*. Adopted by the Air Quality Board January 3, 2007. http://www.airquality.utah.gov/Planning/SIP/popups/SecIX/SIP_O3_IX.D_popup.htm.

[155] See, for example, I. Parry, *Is Pay-As-You-Drive Insurance a Better Way to Reduce Gasoline than Gasoline Taxes?* Resources for the Future, RFF DP 05-15, April 2005.

[156] *Texas Mileage Study: Relationship Between Annual Mileage and Insurance Losses Progressive Insurance*, December, 2005. http://www.nctcog.org/trans/air/programs/payd/PhaseI.pdf.

affordable for low-mileage drivers, which could reduce the number of uninsured motorists. In individual cases, however, as when the high cost of housing forces those in low-wage jobs to live far from their places of work, PAYD would increase the burden of transportation costs. A special fund could be established to subsidize the increase in insurance to low-income workers with commute distances in excess of the average.

Political and Other Considerations

Although many states and several insurance companies have shown an interest in PAYD insurance, the insurance industry as a whole has not been very receptive to date. In a voluntary program, companies already in the market could lose low-mileage customers to new companies that can afford to offer these drivers mileage-based premiums without having to subsidize coverage for high-mileage drivers. To avoid this potential source of opposition to the program, the state could offer incentives only for policies that insurance companies write for their existing customers or for drivers new to the state. When the program becomes mandatory, this concern disappears, because reduced premiums for low-mileage drivers will be offset by increased premiums for high-mileage drivers.

An alternative approach to reduce VMT through monetary incentives would be increasing the state gas tax. At 24.5 cents per gallon, Utah has the 14th highest gas tax in the nation; the national average is 20.3 cents per gallon. As noted above, PAYD insurance would in effect increase the variable cost of driving by 6.8 cents per mile. Achieving the same result by raising the gas tax would require an increase of roughly $1.33 per gallon in the gas tax, something that would not be popular with the general public.[157] Also, a gas tax increase, unlike PAYD insurance, would increase the tax burden in aggregate unless offset by reductions in other taxes such as the state income tax.

Objections are sometimes raised to PAYD insurance based on privacy concerns. This is particularly the case when the proposed mileage verification system relies upon GPS-based information. A system based on periodic odometer readings will probably be adequate for such a program, however. Also, citizens from rural areas and their representatives object to PAYD insurance due to the above-average amount of driving that typically occurs in such areas.

Priority

PAYD insurance could be an important strategy for reducing vehicle fuel use and thereby helping to meet the Governor's energy efficiency goal. It also would provide ancillary benefits, including less traffic congestion, fewer vehicle accidents, and greater equity with respect to insurance premiums. For these reasons, we recommend implementation of this policy as a **high priority.**

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[157] A gas tax increase of $1.33 per gallon would in fact reduce fuel consumption by more than a PAYD policy in the long-term because it would affect not only the amount people drive but also their choice of vehicle. We are proposing other mechanisms to increase vehicle efficiency, however.

Option 18: Reduce the Rate of Growth in Vehicle-Miles Traveled

Background

Utah's population is now growing at a rate of 2.3 percent per year and is expected to grow at over 2 percent per year through 2017.[158] This is more than twice the rate of population growth in the U.S. as a whole. The high growth rate represents a challenge to efforts to reduce light-duty vehicle energy use in absolute terms, but creates opportunities to reduce energy use relative to a business-as-usual scenario. The faster construction of homes and commercial buildings in rapidly-growing areas increases the potential to integrate transportation and land use planning and implement principles of smart growth, including increased density, infill and mixed use development, and improved access to transit.

Research has shown in general terms that the amount of travel done by households could be reduced by about 20 percent through application of smart growth principles. Assuming that vehicle-miles traveled (VMT) grows at the same rate that population does, this would imply that the 25 percent population growth anticipated for Utah over the next decade could be accommodated in such a way as to keep VMT growth to 20 percent, while improving quality of life. The passenger transportation sector would then be 4 percent more efficient than it would otherwise have been.

In reality, however, the amount of travel in Utah is projected to grow even faster than population due to the dispersion of new development and rising incomes, among other factors. If the state were to implement programs that reduce the growth in VMT, energy savings could be substantial, especially in the medium-to-long term. In fact, if this growth goes unchecked, it will be difficult to realize a long term reduction in transportation energy use, no matter what technological advances are made on the vehicle side.

While planning decisions are made at the local level, state policies influence development decisions through infrastructure investment and incentive programs. In Maryland, for example, state dollars go only to projects that are consistent with statewide growth management policy. Massachusetts has a suite of programs to promote smart growth, including a Smart Growth Zoning Incentive, which offers municipalities about $6,000 per residential unit built in any transit-accessible area rezoned to increase density.

In Utah, 80 percent of the population lives in the rapidly growing Wasatch Front region. Envision Utah recently released the findings of its Wasatch Choices 2040 project, including a Vision Scenario that reflects the preferences of participants in a visioning process that involved 1,000 area residents. The Vision Scenario steers 13 percent of new development (compared with 4 percent in a business-as-usual scenario) into walkable, mixed-use districts,[159] like those under development in Kennecott Land's new Daybreak community. Envision Utah's modeling results show a modest but measurable reduction in VMT in the Vision Scenario relative to business-as-usual.

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[158] http://www.governor.utah.gov/dea/Projections/05Baseline/5yearagegroupbyareagender.xls.
[159] Envision Utah, *Wasatch Choices 2040.* 2007.

Realizing a statewide growth scenario having the features of Envision Utah's Vision Scenario would involve the actions of communities across Utah. It would also depend upon the state's willingness to alter its infrastructure investments accordingly. In addition, the state could provide considerable assistance through training and support functions such as those offered through the Quality Growth Commission.

Specific Energy Efficiency Proposal

This policy proposes that the state use its funding and support programs to keep the annual percent growth in VMT to no more than the percent growth in population, beginning in 2010. This is a modest goal that could be strengthened in the future. While local government would determine how to moderate VMT growth, the state could ensure that the growth goal was met by, for example, making this a precondition for approval of the Statewide Transportation Improvement Program (STIP). The STIP is in turn a product of the Utah Department of Transportation's work with Utah's four Metropolitan Planning Organizations (MPOs), which represent local governments.

In particular, we are proposing that distribution of state and federal funds for roads, transit, and other transportation projects and programs be contingent upon MPOs developing and implementing transportation plans that meet the VMT growth goal stated above. This approach would lead to additional funding for transit projects and other alternatives to driving, and some alterations in planned highway projects. State contributions to and incentives for non-transportation projects and programs relating to development patterns should also carry a requirement of consistency with the goal for growth in VMT. This may affect school and water/wastewater projects, for example.

Energy Savings

The Utah Foundation projects VMT growth in 2004-2030 of 87 percent, compared with 69 percent growth in population.[160] This corresponds to a difference of roughly 0.4 percent per year between the two growth rates. Consequently, we calculate energy savings from implementing our proposal by reducing projected growth in gasoline use by 0.4 percent per year from 2010 through 2020. As shown in Table 22, the reduction in VMT and hence energy savings reaches about 2.4 percent in 2015 and 4.3 percent in 2020, relative to the reference projections.

Cost and Cost-Effectiveness

Smart growth can produce substantial cost savings in a wide range of categories.[161] While an effective program to reduce growth in VMT will require major new investments in transit and other alternatives to the automobile, it also can reduce costs for road construction and maintenance, as well as other infrastructure expenses. Estimating the magnitude of these shifts in investment would require, among other things, an analysis of changes to the projects and programs in the STIP that would allow Utah to

[160] Utah Foundation, *Fueling Our Future*, September 2004.
[161] See, e.g., Transit Cooperative Research Program Report 74, *Costs of Sprawl – 2000.*

meet the goal of limiting growth in VMT. We do not propose to do that here, but an analysis conducted by Envision Utah in 2000 gives a sense of the results one might expect.

Envision Utah estimated infrastructure costs for a Quality Growth Strategy that could be viewed as a precursor to the Vision Scenario described above. For the period 1998-2020, combined road, transit, water, and other (sewer and utility) costs in a Baseline scenario totaled $26.5 billion (in 1999 dollars), while costs for the Quality Growth Strategy were $21.9 billion, a 17 percent reduction.[162] In addition, if we consider only the reduction in VMT following from implementation of this policy through 2015, fuel savings through 2030 total $709 million (present value).

Table 22 – Savings from Keeping Growth in VMT at or Below Population Growth

Year	Percent Reduction in VMT	Gasoline Savings (thousand barrels per year)	Gasoline Savings (trillion Btu per year)
2010	**0.4**	**110**	**0.57**
2011	0.8	223	1.16
2012	1.2	340	1.77
2013	1.6	461	2.40
2014	2.0	585	3.05
2015	**2.4**	**714**	**3.72**
2016	2.8	847	4.42
2017	3.2	985	5.13
2018	3.5	1126	5.87
2019	3.9	1272	6.64
2020	**4.3**	**1423**	**7.42**

Environmental and Social Benefits

Like pay-as-you-drive (PAYD) insurance, smart growth policies will reduce emissions of greenhouse gases and other pollutants in proportion to the reduction in driving. The reductions in Table 23 were estimated using the same approach described in the PAYD discussion above.

Table 23 – Estimated Emissions Reduction from Reducing the VMT Growth Rate

Pollutant	Avoided Emissions in 2015	Avoided Emissions in 2020
Carbon dioxide (thousand metric tons)	262	522
Hydrocarbons (short tons)	491	624
NOx (short tons)	312	369

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[162] Envision Utah, "Quality Growth Strategy and Technical Review," 2000.

A host of other environmental benefits would follow, including open space and habitat preservation and improved water quality due to reduced watershed damage and roadway runoff.

Smart growth policies nationwide have gained a large and diverse following for reasons that have nothing to do with energy savings or air pollution reductions. Reducing highway congestion is one of the primary reasons there is broad public support for Smart Growth initiatives. Even a 4 percent reduction in VMT can have a significant impact on road congestion and trip times during peak driving periods. Formation of Utah's Quality Growth Commission in 1999 attests to the view of the Legislature that successful growth management is a major determinant of quality of life.

Political and Other Considerations

Establishing the goal proposed here and taking the steps necessary to meet that goal would be a political challenge. However, the Wasatch Front Regional Council, which is the metropolitan planning organization for the area that is home to over 80 percent of Utah's residents, is considering the adoption of this same goal of no net increase in per capita VMT in its next Long Range Transportation Plan. The goal proposed here for the state would then simply represent the state's commitment to ensuring that its funding decisions and development-related policies support the goal proposed by local officials responsible for transportation and land use planning in the Wasatch Front Region. This commitment will in fact be essential to the success of the WFRC goal, assuming it is adopted.

Smart growth and alternatives to driving are crucial components of energy efficiency planning for the transportation sector. Even in a rapidly-growing state like Utah, land use changes are best viewed as shifts occurring over decades. Ultimately, growth patterns, transit investment, and support for walking and biking will strongly influence the efficacy of pricing strategies, because drivers' receptivity to price signals depend upon the availability of alternative mode and location choices.

Priority

Despite the relatively modest energy savings shown here, a program to manage growth in VMT is essential to any comprehensive state energy efficiency plan. Consequently, we recommend that policy makers view this option as a **high priority**.

Case Study 8:

Wasatch Choices 2040:
Land Use and Transportation Planning Case Study

Over 80 percent of Utah's population lives along the rapidly-growing Wasatch Front where approximately 34,000 people are expected to be added each year. The Wasatch Front Regional Council (WFRC) and the Mountainland Association of

Governments (MAG) are responsible for creating the official, federally-recognized regional transportation plan for the Wasatch Front.

Following the formation of a Steering Committee, 14 public workshops, and expert analysis from Envision Utah (a local not-for-profit planning organization), a comprehensive plan, or "vision" report, for land use and transportation in the Wasatch Front was developed. The report, *Wasatch Choices 2040*, reflects the input of 1,000 area residents. The Vision Scenario in this report steers 13 percent of new development (compared with 4 percent in a business-as-usual (BAU) scenario) into walkable, mixed-use districts with 12 percent more mass transit compared to a 2030 BAU plan, thereby reducing the need for driving.

Envision Utah's modeling results show a modest but measurable reduction in vehicle-miles traveled in the Vision Scenario relative to business-as-usual scenario. The Growth Principles included in the report were adopted unanimously by the elected officials of WFRC and MAG and include ten strategies that local governments can use in planning considerations.

Implementation Strategies for Local Government

1. Develop a Local Land Reuse Strategy
2. Provide Incentives for Contiguous Growth and Infill
3. Preserve Future Transportation and Utility Corridors
4. Create Walkable Commercial and Mixed-Use Districts
5. Plan for Transit Oriented Development
6. Plan for and Build Neighborhood-friendly Elementary Schools
7. Create a Plan for Workforce Housing
8. Interconnect Roadways and Pedestrian Paths
9. Plan for Job Centers and Economic Development Readiness
10. Plan to Minimize Development and Maximize Conservation on and near Critical Lands

Source: Envision Utah, Wasatch Choices 2040, 2007

Option 19: Improve Enforcement of Highway Speed Limits

Background

At high speeds, vehicle efficiency falls off rapidly with further increases in speed, as aerodynamic drag begins to dominate vehicle energy requirements. The speed at which fuel economy is highest varies from vehicle to vehicle, but is typically below 60 miles per hour (mph) for a light-duty vehicle.[163] Federal Highway Administration tests of nine light-duty vehicles in 1997 found that fuel economy declined on average by 3.1 percent when speed increased from 55 mph to 60 mph and by 8.2 percent increasing from 65 to 70 mph.[164] For a heavy truck such as a tractor trailer, fuel economy declines by about 2 percent per mph at highway speeds.[165] Thus, slowing high-speed driving would be one means of improving the real-world efficiencies of cars and trucks. This could be accomplished by reducing the maximum speed limit for all vehicles to 65 mph or more stringently enforcing the existing speed limits.

House Bill 199, considered but not adopted in the 2007 legislative session, would have limited speed limits on limited access highways for Class 7&8 vehicles (those with Gross Vehicle Weight over 26,000 lbs.) to at most 65 miles per hour. At the same time, a bill (Senate Bill 17) increasing the maximum speed limit from 75 miles per hour to 80 miles per hour, among other changes to the traffic code, passed the State Senate during the 2007 legislative session but was subsequently amended to eliminate the speed limit increase.[166]

The Utah Department of Transportation (UDOT) sets speed limits for roads based on traffic engineering and safety studies, among other considerations. The maximum speed limit allowed on rural highways is 75 mph. Reduction in speed limits has been proposed on previous occasions in Utah and has met with little favor. In fact, UDOT notes that reducing speed below the design speed for the given roadway is ill-advised: "Setting an unrealistically low speed limit that is not appropriate for road conditions generally has no effect on vehicle speeds or safety. This has been demonstrated in numerous 'before and after' research studies of speed limits changes. The majority of drivers tend to drive a speed that their experience indicates is safe for the road conditions. An unrealistic speed limit may be disregarded and result in disrespect for the law by normally law-abiding drivers."[167]

Specific Energy Efficiency Proposal

Rather than lowering current speed limits, this policy proposes more stringently enforcing the existing highway speed limits. Doing so could both increase highway safety

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[163] "Drive more efficiently." U.S.DOE and U.S. EPA, http://www.fueleconomy.gov/feg/driveHabits.shtml.

[164] *Transportation Energy Data Book*, 2006. Oak Ridge National Laboratory.

[165] "Factors Affecting Truck Fuel Economy." Goodyear Tire, http://www.goodyear.com/truck/pdf/radialretserv/Retread_S9_V.pdf.

[166] http://le.utah.gov/~2007/htmdoc/sbillhtm/SB0017S02.htm.

[167] *Speed Limits.* Utah Department of Transportation, Division of Traffic and Safety. www.udot.utah.gov/dl.php/tid=1342/save/**Speed**%20studies%20brochure%20June%2005%5B1%5D.pdf.

and provide fuel savings. Given demands on the time of police and highway patrol, additional enforcement would best be approached through other means, including increased use of radar, lasers and speed cameras, and education.

Energy Savings

In Utah, as in many other states, recommended practice is to set speed limits at the 85th percentile of driving that occurs on the roadway. In reality, speed limits are set lower than this for most roads; on average, over half of all traffic travels over the speed limit. Surveys have shown that, on highways, 50 percent of vehicles exceed the speed limit. Virtually all vehicles are within 10 miles of the limit, however.[168]

To estimate energy savings from additional enforcement, we assume that: 1) 50 percent of vehicles on highways are exceeding speed limits; 2) that they are exceeding the limit by 5 miles per hour on average; and 3) that their fuel economy is consequently 8 percent lower than it would be traveling at the speed limit. In Utah, 49 percent of all travel is on arterials and 39 percent is on freeways, giving a total of 88 percent highway driving. This leads to an estimate of energy savings of up to 3.3 percent from improved enforcement of speed limits. If we assume the enforcement program leads to a 50 percent reduction in speeding, estimated energy savings would be as shown in Table 24.

Table 24 – Estimated Benefits of Improved Speed Limit Enforcement

Year	Percent Fuel Savings	Gasoline Savings (thousand barrels per year)	Diesel Savings (thousand barrels per year)	Total Fuel Savings (trillion Btu per year)
2008	1.6	430	159	3.16
2009	1.6	438	168	3.26
2010	**1.6**	**446**	**175**	**3.34**
2011	1.6	455	182	3.43
2012	1.6	463	189	3.51
2013	1.6	472	197	3.60
2014	1.6	481	204	3.69
2015	**1.6**	**490**	**212**	**3.79**
2016	1.6	499	221	3.88
2017	1.6	508	229	3.98
2018	1.6	518	239	4.08
2019	1.6	528	248	4.19
2020	**1.6**	**538**	**258**	**4.30**

It should be noted that, if combined with policies proposed above to increase vehicle efficiency or reduce vehicle miles traveled, enforcing the speed limit would save

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[168] *Design Speed, Operating Speed, and Posted Speed Practice.* National Cooperative Highway Research Program Report 504. Transportation Research Board, 2003.

somewhat less fuel. If the clean car standard, PAYD insurance, and smart growth policies were in place, for example, gasoline savings from speed limit enforcement would be 400,000 barrels per year in 2015 and remain at that level through 2020. Diesel savings would be largely independent of the heavy truck policies described below, however. This is because most truck miles in Utah are driven by out-of-state trucks,[169] which would not be eligible for the efficiency improvement loans we propose.

Cost and Cost-Effectiveness

The cost to the state for this effort could be paid for in full or in part from additional revenue from speeding fines. In the case of commercial trucks, drivers' time warrants special consideration; it can be a greater financial consideration than fuel costs. As an example, consider a truck that reduces speed from 70 mph to 65 mph, thereby increasing fuel economy from 6.1 mpg to 6.7 mpg.[170] This would save 1.8 gallons per hour while reducing the distance covered and therefore the productivity of driver and truck by 7 percent. At $2.80 per gallon, the average 2006 pump price of diesel in Utah, savings are $5. However, the value of the time lost, at a rate of $60 per hour, is $4.20. Thus there are net savings inclusive of driver costs.

There are motivations to reduce speed other than fuel savings, however, including complying with speed limits, improving safety, and limiting roadway damage, which increases with the square of vehicle speed. This discussion considers energy benefits only, but a comprehensive analysis of benefits would be well worth pursuing.

Unlike some of the efficiency policies discussed above, benefits for this policy accrue only for the time period in which it is in place; cumulative fuel cost savings from improved speed limit enforcement from 2008 through 2015 would be $400 million (present value), with all savings generated by 2015.

Environmental and Social Benefits

Emissions of CO_2 would be reduced by 272,000 metric tons per year in 2015 and 309,000 tons in 2020. Criteria pollutant emissions are regulated on a grams-per-mile basis (or, in the case of heavy trucks, a grams per brake-horsepower-hour basis), but nonetheless are affected to varying degrees by speed. NOx emissions in particular consistently increase with speed and should therefore decline with better enforcement of speed limits.

The safety effects of reducing excessive highway speeds are complicated, but certain basic facts remain. Perhaps most importantly, the likelihood that an accident will produce a fatality increases exponentially with the speed at which it occurs.[171] The

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[169] Federal Highway Administration, 1998, "Freight Transportation Profile—Utah Freight Analysis Framework," http://ops.fhwa.dot.gov/freight/freight_analysis/state_info/utah/ut2.pdf.

[170] U.S. Department of Transportation, 2000, "Technology Roadmap for the 21st Century Truck Program."

[171] Insurance Institute for Highway Safety, *Q&A: Speed and Speed Limits*, January 2007. http://www.iihs.org/research/qanda/speed_limits.html#7.

differential in speed between vehicles greatly exceeding the speed limit and those within the limit also creates a hazard, and speed limit enforcement would reduce that hazard.

Political and Other Considerations

While reducing the speed limit is generally difficult politically, better enforcing current law should be less controversial, and may be politically viable primarily on the basis of enhanced public safety and the reduction in serious injuries and deaths from vehicular accidents. On the other hand, if a large percentage of drivers regularly exceed the speed limit, as assumed above, much of the traffic engineering community would take this as an indication that existing speed limits are set too low. Given the recent debate in the Utah Legislature over a proposed increase in speed limits and the Utah Highway Patrol's testimony against the measure, the proposal to better enforce today's speed limits would likely be controversial. This holds true for speed requirements for heavy trucks as well: the American Trucking Association recently endorsed a proposal to limit the speed of heavy trucks to 68 miles per hour; the Owner-Operator Independent Drivers Association opposed the idea.[172]

Priority

This policy is not likely to be popular with the majority of the public and also will result in energy savings that increase relatively slowly over time. Therefore we recommend it be viewed by policy makers as a **low priority.**

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[172] See http://www.truckline.com/NR/exeres/CB4D4AAD-27EB-4801-8F4A-B82F45E03D70.htm and http://www.landlinemag.com/Special_Reports/2007/Jan07/SR%2001-29-07%20OOIDA%20speed%20limiters%20by%20JJ.htm .

Option 20: Improve the Efficiency of Heavy-Duty Trucks and the Goods Movement System

Background

Heavy trucks are responsible for 20 percent of Utah's transportation energy use and this usage is growing faster than light-duty fuel consumption. Tractor-trailers dominate heavy-duty fuel use due to their high annual mileage and relatively low fuel economy. Many tractor-trailers traveling Utah highways are out-of-state trucks.

Trucking companies are sensitive to fuel costs, which are often second only to labor among their business expenses; a tractor-trailer may consume tens of thousands of dollars of fuel annually. Truck manufacturers may therefore be more aggressive in improving the fuel economy of their products than are light-duty vehicle manufacturers. Yet substantial barriers to efficiency do exist in the truck market, including the rapid turnover of trucks from first to second owner and the absence of standards for heavy-duty fuel economy, or even a standardized test procedure to measure it. Consequently, there are numerous technologies and strategies available to improve fuel economy that are not fully utilized. Indeed, average fuel economy for new tractor-trailers could be raised by over 50 percent through a variety of cost-effective existing and emerging technologies, including engine improvements, transmission enhancements, and weight reduction.[173]

Another opportunity to save fuel is by reducing idling of long-haul trucks. Long-haul tractor-trailers typically idle several hours per day to produce heating, cooling and power for drivers when their vehicles are stationary. Various devices are available or under development to eliminate the need for extended idling, including direct-fired heaters, auxiliary power units (APUs), and truck stop electrification. None is yet widely used in the U.S.

Companies with large trucking operations are beginning to take on ambitious truck efficiency targets. In 2005, Wal-Mart announced its intention to improve the efficiency of its heavy-duty fleet by 25 percent in three years and to double it in ten years. FedEx has committed to purchase of hybrid delivery trucks that are being developed to their specifications, including a target of 50 percent improvement in fuel economy and reduced tailpipe emissions.

Retrofitting long-distance tractor-trailers with energy-saving equipment is a relatively fast and inexpensive way to make a dent in heavy-duty energy use. For trucks that travel extensively in stop-and-go traffic, hybrid technology is attractive. While heavy-duty hybrids are mostly still at the prototype stage, progress is rapid, and hybrids should soon be available for parcel delivery, utility, and refuse disposal trucks, to name a few important applications. The federal government currently offers tax credits for heavy-duty hybrids, which should play a role in accelerating the arrival of these vehicles in the market. These credits pay for

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[173] T. Langer, 2004, "Energy Savings through Increased Fuel Economy for Heavy-Duty Trucks." Report prepared by the American Council for an Energy-Efficient Economy for the National Commission on Energy Policy.

only a portion of the incremental costs, however. Furthermore, the federal credits expire at the end of 2009.

Apart from improving truck efficiency, freight energy use can be reduced by increasing the share of goods traveling by rail, a far less energy-intensive mode. The two major cross-country freight routes passing through Utah, Route 80 and Route 70-Route 15, both are paralleled by Class I rail lines. Increased freight volumes on these routes, especially in the Los Angeles-Chicago-New York corridor due to increased trade with Asia, call for a rethinking of opportunities to maximize the use of rail and intermodal services. This corridor is the most favorable in the U.S. for intermodal freight; however, 72 percent of potential intermodal rail traffic has already been captured.[174] For freight originating or terminating in Utah, intermodal options currently are more limited. UDOT has listed several freight projects, including two outside Utah, which would assist in the operation of rail freight in Utah.

An increasingly important corridor is the CANAMEX Corridor, following Route 15 in Utah. The route is thought to be too taxing for rail due to the steep ascents required in Northern Arizona, so all attention to upgrading the corridor has focused on truck movement.[175]

Specific Energy Efficiency Proposal

Our first policy proposal is to establish a low-interest loan program, beginning in 2008, to promote the purchase of new trucks or the retrofit of existing trucks with approved energy efficiency technologies and equipment. In particular, equipment in the efficiency package identified by U.S. EPA's SmartWay Transport Partnership would be eligible. This SmartWay upgrade kit, which includes aerodynamic add-ons for trailers, efficient tires, and APUs allowing long-distance truckers to dramatically reduce idling, has been found to reduce fuel consumption by 15 percent or more while reducing emissions.

The U.S. EPA is seeking state partners to offer loans to truckers to assist with the purchase of these technologies. Under the proposed loan program, heavy-duty hybrids would be eligible for loans as well. If properly designed, such loan programs can result in net monthly savings to truckers beginning at the time of purchase. A state agency would provide the loans at an interest rate comparable to the state's cost of capital.

Our second proposal is for another low-interest loan program, this one for the electrification of truck stops in Utah to allow drivers to turn off their trucks during rest stops. Truck stop electrification (TSE) can be done using on-board or off-board systems. An on-board system simply provides power outlets for trucks that have electrical heating/ventilation/air conditioning (HVAC) systems and an electrical plug, while an off-board system brings HVAC to the truck, requiring no special equipment on the truck. For this discussion, we assume off-board systems will be used, since Utah cannot control the

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[174] American Association of State Highway and Transportation Officials, *Freight-Rail Bottom Line Report*. 2002. www.transportation.org.
[175] Wasatch Front Regional Council, *Long-Range Plan 2030.* December 2003. http://www.wfrc.org/reports/lrp/CHAP%204%20Capacity%20Needs.pdf.

equipment on the out-of-state trucks that are the primary users of truck stops. On-board systems would be far less expensive to truck stop owners, however, and the number of trucks manufactured with electric HVAC systems will increase, so the best strategy might be a mixture of the two system types.

With regard to increased use of freight rail, rail freight projects in the UDOT 2030 Long Range Transportation Plan should be completed.[176]

Energy Savings

We first estimate savings from the loan program for truck efficiency equipment, beginning with its application to the improvements identified by SmartWay. Determining what trucks are likely candidates for the program requires a breakdown of the heavy-duty truck stock. By far the biggest consumers of diesel fuel in the aggregate are "heavy-heavy" trucks (those having Gross Vehicle Weight of at least 26,000 pounds), primarily tractor-trailers.

Half of all heavy-heavy truck miles driven by Utah-registered trucks are driven by long-distance trucks, i.e. those having a primary range of operation over 500 miles. These are the trucks that would use APUs, since they would frequently be away from their home bases at night. The number of Utah trucks fitting this description is 6,282; of these we estimate that 20 percent already have anti-idling technology, leaving 5,025 trucks eligible to acquire auxiliary power units.[177] Fuel consumption at idle is roughly one gallon per hour, and typical annual hours of idling is 1,830 per year. A diesel-fueled APU uses on the order of 0.18 gallons per hour, resulting in net savings for these trucks of 1,500 gallons per year.[178]

The other efficiency equipment in the SmartWay upgrade kit, namely energy-efficient tires and trailer side skirts, is beneficial to the somewhat larger set of heavy-heavy trucks that travel largely at highway speeds. We assume that trucks typically driving 200 or more miles per day fall into this category; there are 7,742 such trucks registered in Utah. We assume that the fuel savings from this equipment totals 8 percent.

The U.S. EPA has demonstrated that a low-interest loan program would allow truckers purchasing equipment in the SmartWay package to realize fuel cost savings that would exceed their monthly loan payments. We assume that usage of the loan program ramps up over five years, reaching 75 percent of trucks eligible for the various types of equipment by 2012. This results in a 4.1 percent reduction in fuel consumption over the entire truck stock.

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[176] Utah Department of Transportation, *Utah Transportation 2030.* January 2004.
[177] Based on queries of the *2002 Vehicle Inventory and Use Survey*, U.S. Census Bureau. http://www.census.gov/svsd/www/vius/2002.html.
[178] F. Stodolsky, L. Gaines, and A. Vyas. 2000. *Analysis of technology options to reduce the fuel consumption of idling trucks.* Argonne, IL: Center for Transportation Research, Argonne National Laboratory, June.

These technologies will be joined by others, including a variety of hybrid technologies in the succeeding years, and the loan program should evolve to reflect this. We assume that the fuel savings of vehicles eligible for loans under the program will double over the period 2012 to 2017, leading to the savings shown in Table 25.

Table 25 – Savings from Low-Interest Loans for Heavy Truck Efficiency Improvements

Year	Percent Diesel Savings	Diesel Savings (thousand barrels per year)	Diesel Savings (trillion Btu per year)
2009	1.0	107	0.62
2010	**2.1**	**222**	**1.29**
2011	3.1	346	2.01
2012	4.1	480	2.78
2013	5.0	599	3.47
2014	5.8	726	4.21
2015	**6.6**	**862**	**5.00**
2016	7.4	1,009	5.85
2017	8.3	1,165	6.76
2018	8.3	1,211	7.02
2019	8.3	1,259	7.30
2020	**8.3**	**1,309**	**7.59**

We next estimate the fuel savings resulting from the loan program for truck stop electrification. There are over 50 truck stops on I-15, I-70, and I-80 in Utah.[179] If ten truck stops install TSE each year from 2010 through 2014, and the average installation size is 25 spaces, there will be 1,250 spaces available by 2014.[180] Idling of a heavy-heavy truck consumes about one gallon per hour.[181] Assuming each space is used for two 6-hour periods per day, fuel savings would be as shown in Table 26. The power requirement of the truck while using the TSE system is approximately 2.1 kW.[182] Table 26 shows net energy savings of the program by year. The diesel savings is six times the additional electricity consumed based on a comparison of primary energy content.

Cost and Cost-Effectiveness

State expenses, which would amount to administrative costs for the loan programs and any write-off of bad debt, should be modest. If so desired, loans could be offered at

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[179] See, e.g., http://www.aitaonline.com/TS/UT.html.
[180] We estimate this is slightly less than half of all commercial truck stop spaces in Utah.
[181] F.Stodolsky et al. 2000. "Analysis of technology options to reduce the fuel consumption of idling trucks," Center for Transportation Research, Argonne National Laboratory.
[182] N. Lutsey. 2003. "Fuel Cells for Auxiliary Power in Trucks: Requirements, Benefits, and Marketability," Institute for Transportation Studies, University of California, Davis.

an interest rate slightly higher than the state's cost of capital in order to cover these expenses.

Table 26 – Savings from Truck Stop Electrification

Year	Diesel Savings (thousand barrels per year)	Electricity Consumed (GWh per year)	Net Savings (trillion Btu per year)
2010	**26**	2	0.13
2011	52	5	0.25
2012	78	7	0.38
2013	104	9	0.51
2014	130	11	0.64
2015	**130**	11	0.64
2016	130	11	0.64
2017	130	11	0.64
2018	130	11	0.64
2019	130	11	0.64
2020	**130**	11	0.64

Regarding overall cost, the typical SmartWay upgrade kit costs $16,500.[183] Based on the fuel savings associated with that package and decline in truck miles per year over time, we estimate that the benefit-cost ratio for the package will be about two-to-one over the life of the truck. The proposed loan program could shift some of this cost from the truck owner to the state but this would not affect the overall cost effectiveness of the efficiency improvements from a societal perspective.

For truck loans granted through 2015, fuel cost savings out to 2030 total $657 million, present value. If we assume the benefit-cost ratio for the loan program as a whole is the same as it is for the SmartWay upgrades, then cost of the program through 2015 would be about $328 million, giving a net savings of $328 million during 2008-2030.

The cost of truck stop electrification is about $15,000 per space for an off-board system.[184] We assume all 1,250 spaces are converted prior to 2015. Net cost savings, including capital costs, fuel savings, and electricity costs at 6.6 cents per kilowatt hour, are $112 million (present value) over the period 2010-2030.

Environmental and Social Benefits

Fuel savings associated with the heavy-duty truck policy would result in a reduction in CO_2 emissions of 375,000 metric tons in 2015 and 568,000 tons in 2020. Heavy-duty trucks are a major contributor to total Utah highway emissions of NO_x (49

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[183] U.S. EPA "Innovative Financing – Frequently Asked Questions," http://epa.gov/smartway/documents/420f07027.htm.
[184] Electric Power Research Institute, "Truck Stop Electrification: A Cost-Effective Solution to Reducing Truck Idling." December 2004.

percent) and PM 2.5 (76 percent, exhaust component),[185] and reduced fuel throughput of more efficient trucks could be expected to reduce these emissions. Since emissions standards for trucks are not regulated on a per-gallon basis, however, it is difficult to estimate the magnitude of these reductions.

The truck stop electrification program would reduce CO_2 emissions an additional 56,000 metric tons in both 2015 and 2020. Based on U.S. EPA estimates on the emissions of idling trucks,[186] the program would reduce NO_x by 814 tons in both 2015 and 2020. PM reductions would be 5 tons in 2015 and 3 tons in 2020.

Political and Other Considerations

The loan programs proposed here would presumably be welcomed by trucking companies and truck stop owners. In general, we expect little or no political opposition to this proposal.

Priority

Improvements to trucks and to the goods movement system as a whole are an essential component of an energy-efficient transportation sector. But because the loan programs proposed here achieve moderate savings, we recommend that they be viewed as **medium priority** by policy makers.

Case Study 9:

Truck Stop Electrification:
Sapp Brothers Travel Center, Salt Lake City

In 2007, the Sapp Brothers Travel Center, a truck stop in Salt Lake City located along I-215, was retrofitted with devices that eliminate semi-truck idling. These devices, called auxiliary power units (APUs) provide power to 51 parking spaces via a plug-in window adapter, allowing drivers to rest and stay comfortable while their engines remain off. The APUs save fuel and money while reducing the associated emissions that typically result from semi-truck idling during federally required breaks.

The APU device was created by IdleAire Technologies Corp., based in Knoxville, Tennessee. The Sapp Brothers project is a cooperative effort between IdleAire and the Utah Department of Transportation, which funded 80 percent of the project's installation cost.

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[185] Percentages cited were calculated from the Utah DEQ calendar year 2002 on-road mobile emissions inventory.

[186] U.S. EPA. 2004. "Guidance for Quantifying and Using Long Duration Truck Idling Emission Reductions in State Implementation Plans and Transportation Conformity," EPA420-B-04-001.

The Sapp Brothers Travel Center was the first truck stop in Utah to offer the APU technology. Other facilities in Utah are considering installing the fuel-saving device.

Quick Facts

Total Project Cost: $850,400
Projected Annual Fuel Savings: 175,000 gallons of diesel fuel
Projected Annual Cost Savings: $580,000
Projected Cost Savings After 15 Years: $6.3 million
Benefits:
- Saves energy
- Eliminates noise associated with idling
- Eliminates particulate and other emissions from diesel exhaust

Source: Utah Department of Environmental Quality, 2007; IdleAire Technologies Corporation, 2007
Pictured: IdleAire system installed at Petro Travel Center, Knoxville, Tennessee

Option 21: Require Energy-Efficient Replacement Tires for Light-Duty Vehicles

Background

Energy losses due to tire rolling resistance account for about 20 percent of total vehicle energy use. Some tires perform significantly better than others in this regard, however. In particular, "original equipment" (OE) tires, i.e. tires sold with a new vehicle, typically have lower rolling resistance than aftermarket tires, because energy-efficient tires help manufacturers comply with Corporate Average Fuel Economy standards. In 2003, the California Energy Commission issued a report on tire efficiency that found significant potential for oil savings through low rolling resistance tires.[187] The National Academy of Science issued a National Tire Efficiency Study that reached similar conclusions in 2006.[188]

Specific Energy Efficiency Proposal

Starting in 2010, the state would require that replacement tires sold in Utah have rolling resistance less than or equal to the average OE tire in the U.S.

Energy Savings

Each 10 percent reduction in tire rolling resistance leads to roughly a 1-2 percent increase in fuel economy.[189] While data on the efficiency of tires now on the road is limited, analysts estimate that the average OE tire has a rolling resistance on the order of 20 percent lower than that of the average replacement tire. Thus, if aftermarket tires were as efficient as the average tires on new vehicles, vehicle fuel economy would improve by 2-4 percent.

The average life of a tire is about 36,000 miles, or about one-quarter of lifetime vehicle miles. This means that at any given time, about three-fourths of all miles driven are driven on replacement tires. If we assume that replacement OE tires raise fuel efficiency by 3 percent on 75 percent of vehicles, overall vehicle efficiency will increase by 2.25 percent after about three years, when all replacement tires on the road will have been purchased subject to the new requirements. Table 27 shows the resulting gasoline and energy savings. We estimate the gasoline savings would reach 676,000 barrels per year by 2015.

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[187] *California State Fuel-Efficient Tire Report*, California Energy Commission 600-03-001F, January 2003.
[188] National Research Council. 2006. "Tires and Passenger Vehicle Fuel Economy." Transportation Research Board Special Report 286.
[189] See Reference 187.

Table 27 – Savings from Fuel-Efficient Replacement Tires

Year	Percent Gasoline Savings	Gasoline Savings (thousand barrels per year)	Gasoline Savings (trillion Btu per year)
2010	**0.75**	**205**	**1.07**
2011	1.50	419	2.18
2012	2.25	640	3.34
2013	2.25	652	3.40
2014	2.25	664	3.46
2015	**2.25**	**676**	**3.53**
2016	2.25	689	3.59
2017	2.25	702	3.66
2018	2.25	715	3.73
2019	2.25	729	3.80
2020	**2.25**	**742**	**3.87**

Cost and Cost-Effectiveness

The extra cost of a low rolling resistance tire is small, roughly $1 to $2 per tire.[190] If replacement tires were purchased for one-quarter of light-duty vehicles registered in Utah each year beginning in 2010, the extra cost of low rolling resistance tires through 2015 would be $9 million (present value). Fuel savings from the tires purchased over this six-year period would continue through 2017; total fuel savings (present value) for the years 2010-2017 would be $309 million, leading to net savings of $300 million.

Environmental and Social Benefits

The reduction in CO_2 emissions from requiring low rolling resistance replacement tires would be 249,000 metric tons in 2015 and 272,000 tons in 2020. Emissions of regulated pollutants will decline in proportion to the reduction in fuel consumption; reductions are shown in Table 28.

Table 28 – Estimated Emissions Reduction from Energy-Efficient Replacement Tires

Pollutant	Avoided Emissions in 2015	Avoided Emissions in 2020
Carbon dioxide (thousand short tons)	249	272
Hydrocarbons (tons)	465	325
NOx (tons)	296	193

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[190] See Reference 188.

Tire rolling resistance, dry and wet traction, and tread wear are interrelated in complex ways. Safety concerns have been raised over years of discussion of low rolling resistance tires, but recent studies, including the National Academy of Sciences tire study, have concluded that reducing rolling resistance would have no discernable effect on safety. The OE tires that are driven on for the first 3-4 years of owning a new car do not exhibit inferior safety performance.

Political and Other Considerations

A rolling resistance requirement for tires is likely to have public support, because costs would be minimal while collective fuel savings would be substantial. Similar standards proposed at the national level have generated opposition from the tire manufacturing trade association, however. Also, it would be difficult to ensure the availability of low rolling resistance aftermarket tires if Utah were the only state to require them. As in the case of a feebate program, the feasibility of the proposal would be greatly increased if other states were to adopt similar policies at the same time that Utah does. California is currently conducting tire tests in preparation for adopting a requirement that manufacturers report rolling resistance of their tires. California is considering a rolling resistance standard as well.[191] Other states, including Massachusetts and New York, have also expressed interest in tire efficiency standards.

Priority

Improving the fuel-efficiency of tires would save substantial quantities of fuel, and would do so comparatively quickly. The principal challenge to the proposed measure is that Utah may need to rely on other states to adopt identical or similar measures in order to ensure the availability of low rolling resistance tires. Given the need for coordinated state action, we suggest this policy be assigned **medium priority**.

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[191] See http://www.energy.ca.gov/transportation/tire_efficiency/index.html.